

Vaje iz Kvantne mehanike I
Komutatorji in eksponenti operatorjev

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Pokaži, da velja zveza

$$\exp(\hat{A} + \hat{B}) = \exp(\hat{A}) \exp(\hat{B}) \exp(-[\hat{A}, \hat{B}]/2), \quad (1)$$

če velja $[\hat{A}, [\hat{A}, \hat{B}]] = 0$ in $[\hat{B}, [\hat{A}, \hat{B}]] = 0$. Namig: zapišimo operator

$$\hat{f}(t) = \exp(t(\hat{A} + \hat{B})) \exp(-t\hat{A}) \exp(-t\hat{B}), \quad (2)$$

odvajajmo ga po t , ga spravimo v obliko $d\hat{f}(t)/dt = \hat{f}(t)\hat{C}$ in integriramo dobljeno enačbo.